

### **Abstract:**

**Title: An Efficacy Assessment (Short- and Long-Term) of Lead Safe Renovation and Visual Assessment Training**

This proposal for two training efficacy studies will address these questions:

**Can the strategic incorporation of certain types of hands-on activities result in greater worker confidence in their ability to perform lead-safe work practice tasks after a training intervention?**

**How does The HUD on-line visual-assessment for the presence of deteriorated paint training effectiveness compare to the effectiveness of in-person (traditional instructor/student) visual-assessment training and other on-line training modules?**

As long ago as Duncker (1945) and Luchins (1942) comprehensive studies were performed in regard to the necessity of practice for learning transfer. Duncker's study results suggested that students need to be given ample time to practice a skill before the skill can be used in later similar contexts.

Practice, as an effective training technique (especially for transfer), has been encouraged by Clark and Voogel (1985), Cohen and Jensen (1984), Ellis (1965), Hale (1984), Kelley, Orgel and Baer (1985), Olmo (1975), Perkins and Salomon (1988), and Weaver, et al. (1979). Rohmert and Laurig (1977) cited the use of discussion, demonstration, and case studies along with traditional lectures as effective variety to encourage engagement of the trainees. Feldmann, et al. (1990) suggested that small group work and role-playing are effective techniques for adult skills/cognitive training.

These references have been followed more recently by studies in the medical education community. A comprehensive review by McKenna, et al. (2008) of 258 articles exploring measurement of educational effect on practice performance of physicians suggested that "interactive educational strategies seem to be more effective than traditional passive learning."

HUD states in this NOFA that "thousands of workers throughout the U.S. have received lead-safe work practices training; however, there has been little formal evaluation of the effectiveness of various training methods." And that, "...hands-on activities are more effective compared to passive methods of training workers...."

The first proposed study will make a significant contribution toward achieving HUD's goal of evaluating the effectiveness of various training methods. In particular, we are proposing to address the areas as stated above. Our proposed study regarding interactive training techniques for lead-safe work practices will potentially:

- a. improve the ability of contractors to save costs on jobs via increased on-the-job skills transfer including lead-dust clearance compliance.
- b. decrease child and worker exposure to lead dust/hazards
- c. provide additional training curriculum designs to be utilized by other lead training providers.

For the second proposed study regarding the effectiveness of HUD-Required training on visual assessment for lead paint hazards, our study will potentially identify the effectiveness of HUD's current on-line visual assessment course, other identified on-line visual assessment courses and conventional classroom courses in order to compare the degree to which one course may increase the accuracy of visual assessments for the presence of lead paint hazards over other courses.

Both of these proposed studies move forward HUD's stated priority for the improvement of the quality and availability of lead training. In a broader view, the results of this study will improve the ability of a number of disciplines to perform both lead and healthy homes visual assessments. These studies will build on the body of literature in areas that have not heretofore been explored. This is especially timely in that the new U.S.EPA Lead-Safe Renovator Rule is going into effect over the course of the next year.

For the first study: In lead abatement, renovator and work practices training there exists a wide variety of hands-on training activities and formats for those activities (i.e. instructor demonstration, written exercises, student-led problem solving regarding work practices, student work practice skills demonstrations, etc.). In addition, there is a wide variance among training providers in regard to length of time spent on hands-on learning activities and the skills covered during those activities.

This study proposes to address the difference between student work practices problem-solving structured activities (which incorporates written exercises and skills demonstrations) for a minimum of 1.5 hours from other hands-on exercises and lengths of time spent for those activities for transfer of learning and trainee confidence of mastery of the required skills.

For the second study: HUD reports that "visual assessment for the presence of deteriorated paint is another activity for which an evaluation of training effectiveness is needed." HUD is particularly requesting a review of their on-line self-paced training module as it compares to other training or educational methods for visual assessment and recommend improvements to available curricula. This proposal will research alternatives to the HUD on-line visual assessment module by reviewing the effectiveness of the NCHH on-line nursing Pediatric Assessment tool (required for nurses to receive credit for the Essentials of Healthy Housing: Practitioner Course) and the National Coalition of Healthy Homes' on-line CEHRC visual assessment tool required as a final section of the Healthy Homes Specialist Credential examination. We also propose to develop a one-hour classroom lead paint visual inspection course which will incorporate the HUD on-line module to compare to the stand-alone on-line courses as to training effectiveness.

It is anticipated that the findings of these studies will produce training curricula designs that promote effective long-term behavioral outcomes. These curricula, both the renovation work practices and visual assessment will be redesigned to be easily replicated and disseminated to lead trainers such as the National Paint and Coating Association (NPCA) and enforcement jurisdictions that certify training (for example the Ohio and other state Departments of Health).

## **RATING FACTOR 1**

### **(2) (a) CAPACITY OF THE APPLICANT AND RELEVANT ORGANIZATIONAL EXPERIENCE**

#### ***(1) The capability and qualifications of key and supporting personnel***

- For more than thirty years investigators at the University of Cincinnati's Department of Environmental Health (UC) have successfully conducted research and training on many aspects of the effects and prevention of childhood lead toxicity and the effects of lead abatement occupational exposure.
- UC has participated in many of the largest lead research projects ever funded by federal agencies including the United States Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), and the National Institute of Environmental Health Sciences (NIEHS).
- UC was one of the six original EPA Regional Lead Training Centers during the mid-1990's and continues to hold approvals in several states to provide lead training. During these years we have trained hundreds of lead inspectors, risk assessors, supervisors and workers. From January, 2004 through May, 2008 we have held 33 combined Lead-Safe Renovator/Essential Maintenance Practices courses and trained 406 persons.

The key personnel in this proposed project all had leadership roles in one or more of the above-mentioned projects. Co sponsors of the Lead-Safe Renovator/ Essential Maintenance Practices courses have been the Hamilton County Section 8 Program, Real Estate Investment Association (Greater Cincinnati Area), City of Cincinnati Department of Development, Cincinnati Health Department Lead Program, Hamilton County Department of Jobs and Family Services/Daycare Division.

#### ***(2) Past performance of the study team in managing similar projects***

[REDACTED], M.A., Ed.D. has been a faculty member in the Department of Environmental Health at the University of Cincinnati for 20 years. During that time she has worked extensively in the design, development, instruction, and evaluation of lead abatement training interventions for the University and on a state and national level. Dr. [REDACTED] participated on an advisory committee to the USEPA regarding the development of the regional lead training centers and for the development of a national certification examination. She also served as a reviewer for the development of the State of Ohio Department of Health's certification examination for lead abatement professionals. She has been the director of all lead abatement training activities since the inception of the program at the University of Cincinnati. In addition, She worked closely (was principal investigator) with Mr. [REDACTED] on the development of the USEPA-approved curricula for the Supervisor and Project Designer courses, as well as the updated materials several years later.

[REDACTED]

Besides the lead abatement training, Dr. [REDACTED] is Director of the NIOSH-supported Education and Research Center (ERC) Continuing Education Program, and Executive Director of the Great Lakes Regional OTI Education Center. Dr. [REDACTED] holds undergraduate and master's degrees in communication and a doctorate in education/adult training. The ERC Continuing Education Program offers approximately 110 classroom and on-line open-enrollment courses annually in Occupational Safety, Occupational Medicine, Occupational Health Nursing, and Industrial & Environmental Hygiene, training approximately 3,000 health and safety professionals each year. Dr. [REDACTED] participates as an instructor in many of the courses, is a regular speaker at conferences, and has a number of publications to her credit.

[REDACTED] has been an occupational safety and public health trainer for 25 years. In her capacity as a certified lead trainer with the UC Lead Training Program, she has provided training to a diverse population within community agencies, government and business. She has developed co-sponsorships for training and has regularly attended meetings and events to promote the Lead Safe Work Practices/Renovator training sessions. She is a founding member of the Hamilton County Lead Poisoning Prevention Collaborative, which has engaged numerous partners to increase lead testing and reduce lead housing hazards through a variety of training approaches.

In addition, Ms. [REDACTED] is a national and regional trainer and auditor for the National Center for Healthy Housing. In that capacity, she has trained the Healthy Homes Practitioner Courses extensively, as well as audited the course for the National Center's new training partners. She also contributed to the development of the Healthy Homes Specialist credential examination for the National Environmental Health Association.

Since 2004, Ms. [REDACTED] has marketed and facilitated 33 Lead Safe Renovator/ Work Practices sessions, training over 400 individuals. This has been accomplished without a budget for marketing time. The courses have received excellent training evaluations – particularly in the area of learning lead safe work practices. Ms. [REDACTED] has developed a student-led problem solving based hands-on component for the course, which has received commendation from Ohio Department of Health audits and on student evaluations.

[REDACTED] has been with the University of Cincinnati for about 18 years. He now holds the position of Manager of Information Technology/ Audio Visual, Department of Environmental Health. Mr. [REDACTED] will be assisting with the capturing of the visual assessment course for use as a computer-based or on-line training module. Mr. [REDACTED] regularly assists the Department of Environmental Health with the capturing of various lengths of courses and lectures which reside on the department's web page for students and faculty.

[REDACTED], M.S. has been an instructor, data manager/analyst, and a member of a research team for almost 20 years at the University of Cincinnati, beginning with the Cincinnati Soil Lead Abatement Demonstration Project in 1988. In that time period Mr. [REDACTED] has played key roles in most of the research.

Mr. [REDACTED] recently was project manager for a study comparing the UC exterior dust vacuum method, the USEPA HEPA vacuum method, and the HUD wipe method. The results from that study, The Comparison of Methods for the Collection of Exterior Dust in Residential Environments for Lead Determination and Other Purposes (OHLTS0098-03), were recently presented at the American Industrial Hygiene Conference and Exposition (Menrath, et al. 2007).

He was a primary editor of the training materials for the USEPA Lead Abatement Training for Contractors and Supervisors and for Lead Project Planners. He has taught all of the USEPA lead courses for over fifteen years in the Great Lakes Lead Training Center and elsewhere. He has served as Project Manager for numerous field studies in many areas of the US where he performed his responsibilities on-site. He developed protocols, trained staff, oversaw staff performance and performed quality assurance activities in the Exterior Dust and Soil Project that was conducted as part of the Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program. He also developed training materials and participated in training and data quality assurance for the HUD Evaluation.

Mr. [REDACTED] is also involved in the CDC Healthy Homes Training Center and Network project through the National Center for Healthy Housing. He was the principal instructor in the pilot testing in Cincinnati of the course that was developed: "Essentials of Healthy Housing: Practitioners Course". He continues to teach the course. His experiences make him eminently qualified to perform this role in the proposed lead technical study.

[REDACTED] has been a Program Coordinator working within the health & safety continuing education program in the Department of Environmental Health for over 20 years. She assists in the coordination and planning of the OSHA and NIOSH/ERC CE courses. She is involved in planning and coordination of training sites, instruction schedules, training materials and follow-up activities throughout the United States and Canada.

Resumes of the Principal Investigator and other key staff members have been included in this application. All foregoing grant-funded projects were completed on-time and within the grant budgets.

## RATING FACTOR 2

### (2) (b) NEED/EXTENT OF THE PROBLEM.

This proposed project addresses the HUD priority areas regarding the effectiveness of HUD-Required training in Section III (pages 11-12) of the NOFA: C.1.(a)(2)(a) Effectiveness of HUD-Required Training on Lead Safe Work Practices; and C.1.(a)(2)(a) Effectiveness of HUD-Required Training on Visual Assessment.

#### *(1) Review of the Research:*

HUD states in this NOFA that "thousands of workers throughout the U.S. have received lead-safe work practices training; however, there has been little formal evaluation of the effectiveness of various training methods." And that, "...hands-on activities are more effective compared to passive methods of training workers...."

A review of the literature (see Rating Factor 3) does show studies regarding the efficacy of hands-on training formats in other areas of continuing education but not specifically in this area of lead training. This project of two studies is designed to fill that gap of knowledge to potentially improve the efficacy of lead safe work practices and visual assessment training.

#### *(2) Discussion of potential for project to significantly advance the current state of knowledge in this focus area:*

The first proposed study will make a significant contribution toward achieving HUD's goal of evaluating the effectiveness of various training methods. In particular, we are proposing to address the areas as stated above. Our proposed study regarding interactive training techniques for lead-safe work practices will potentially:

- (a) improve the ability of contractors to save costs on jobs via increased on-the-job skills transfer including lead-dust clearance compliance.
- (b) decrease child and worker exposure to lead dust/hazards
  - ODH reports that compliance in the field of lead training is sub-standard in the areas of risk assessment and work practices. At a recent ODH Lead Trainer Summit for Ohio lead trainers, enforcement was reviewed in the context of accurate and engaging training approaches. Extensive discussion took place relative to engaging trainees during hands-on sections of lead courses.
- (c) provide additional training curriculum designs to be utilized by other lead training providers.

For the second proposed study regarding the effectiveness of HUD-Required training on visual assessment for lead paint hazards, our study will potentially identify the effectiveness of HUD's current on-line visual assessment course, other identified on-line visual assessment courses and conventional classroom courses in order to compare the degree to which one course may increase the accuracy of visual assessments for the presence of lead paint hazards over other courses.

Both of these proposed studies move forward HUD's stated priority for the improvement of the quality and availability of lead training. In a broader view, the results of the second study will improve the ability of a number of disciplines to perform both lead and healthy homes visual assessments.

*(3) How the study findings will be used to improve current methods for assessing and mitigating lead hazards:*

As stated in the literature, the use of interactive training techniques increases training transfer and behavioral change on the job. These studies will build on the body of literature in areas that have not heretofore been explored. This is especially timely in that the new U.S.EPA Lead-Safe Renovator Rule is going into effect over the course of the next year.

For the first study: In lead abatement, renovator and work practices training there exists a wide variety of hands-on training activities and formats for those activities (i.e. instructor demonstration, written exercises, student-led problem solving regarding work practices, student work practice skills demonstrations, etc.). In addition, there is a wide variance among training providers in regard to length of time spent on hands-on learning activities and the skills covered during those activities.

This study proposes to address the difference between student work practices problem-solving structured activities (which incorporates written exercises and skills demonstrations) for a minimum of 1.5 hours from other hands-on exercises and lengths of time spent for those activities for transfer of learning and trainee confidence of mastery of the required skills.

For the second study: HUD reports that "visual assessment for the presence of deteriorated paint is another activity for which an evaluation of training effectiveness is needed." HUD is particularly requesting a review of their on-line self-paced training module as it compares to other training or educational methods for visual assessment and recommend improvements to available curricula. This proposal will research alternatives to the HUD on-line visual assessment module by reviewing the effectiveness of the National Center for Healthy Housing (NCHH) on-line nursing Pediatric Assessment tool (required for nurses to receive credit for the Essentials of Healthy Housing: Practitioner Course) and the National Environmental Health Association's on-line CEHRC visual assessment tool required as a final section of the Healthy Homes Specialist Credential examination. We also propose to develop a one-hour classroom lead paint visual inspection course which will incorporate the HUD on-line module to compare to the stand-alone on-line courses as to training effectiveness.

It is anticipated that the findings of these studies will produce training curricula designs that promote effective long-term behavioral outcomes. These curricula, both for lead safe work practices and visual assessment, will be redesigned to be easily replicated and

disseminated to lead trainers such as the National Paint and Coating Association (NPCA) and enforcement jurisdictions that certify training (for example, the Ohio Department of Health and other state Departments of Health).



### RATING FACTOR 3

#### (2) (c) Soundness of the Approach

This application proposes two studies addressing the HUD priority areas regarding the effectiveness of HUD-Required training in Section III (pages 11-12) of the NOFA: C.1.(a)(2)(a) Effectiveness of HUD-Required Training on Lead Safe Work Practices; and C.1.(a)(2)(a) Effectiveness of HUD-Required Training on Visual Assessment.

*(1) Soundness of the study design.*

Study questions/hypotheses:

Proposed Technical Study Plan – Study #1: The use of interactive training formats in lead training for increased learning transfer.

**Can the strategic incorporation of certain types of hands-on activities result in greater worker confidence in their ability to perform lead-safe work practice tasks after a training intervention? (study question/hypothesis)**

Proposed Technical Study Plan – Study #2: A comparison of the HUD on-line visual assessment for lead paint hazards training courses with other selected training classes/formats for learning transfer.

**How does The HUD on-line visual-assessment for the presence of deteriorated paint training effectiveness compare to the effectiveness of in-person (traditional instructor/student) visual-assessment training and other on-line training modules? (study question/hypothesis)**

#### Relevant Literature

As long ago as Luchins (1942) and Duncker (1945) comprehensive studies were performed in regard to the necessity of practice for learning transfer. Duncker's study results suggested that students need to be given ample time to practice a skill before the skill can be used in later similar contexts.

Practice, as an effective training technique (especially for transfer), has been encouraged by Clark and Voogel (1985), Cohen and Jensen (1984), Ellis (1965), Hale (1984), Kelley, Orgel and Baer (1985), Olmo (1975), Perkins and Salomon (1988), and Weaver, et al. (1979). Rohmert and Laurig (1977) cited the use of discussion, demonstration, and case studies along with traditional lectures as effective variety to encourage engagement of the trainees. Feldmann, et al. (1990) suggested that small group work and role-playing are effective techniques for adult skills/cognitive training.

These references have been followed more recently by studies in the medical education community. A comprehensive review by McKenna, et al. (2008) of 258 articles exploring measurement of educational effect on practice performance of physicians suggested that "interactive educational strategies seem to be more effective than traditional passive learning."

### Study Design and Major Outcomes

For Study #1: An Ohio Department of Health database of persons (1,200) who have successfully completed the Lead-Safe Renovators course will be used – this list is in the public domain. In addition, course participant lists from the University of Cincinnati training database and the In-Service Training, Inc. database (another Ohio-approved provider), and the database from the national Paint and Coatings Association (10,000) will be utilized. A survey instrument will be used to collect data needed for the comparison study (see sample draft in appendix). The survey instrument will be answerable anonymously and the consent to participate statement will be included on the survey instrument (which states that the return of the survey form signifies consent to use the respondent's answers as part of the aggregate results of the study). This survey instrument will be validated by expert review and by a pilot test of a small sample of persons who have taken one of the training offerings. (Please see letters of cooperation in the appendix section.)

The survey instrument will be accompanied by a monetary incentive. According to Church (1993), "prepaid cash rewards for completing surveys [have] the most significant impact on increasing response rates...." This monetary incentive will be in the amount of 2.00 USD.

Besides the evaluation of the efficacy of certain hands-on formats for the lead-safe renovator courses, a major outcome of study #1 is the development of a module based on Structured On-the-Job Training (SOJT) to be incorporated into the hands-on training for lead-safe work practices. Ms. [REDACTED] and Dr. [REDACTED] (both skilled in instructional design) will be developing this module based upon the results of the evaluations and classroom feedback from participants.

For Study #2: We will be collecting evaluations of the various forms of visual assessment training (HUD's on-line, others' on-line, and a to-be-developed in-person course) via survey forms from participants retrospectively and well as immediately after completing one of the training offerings.

One of the major objectives of the second study is to develop a short in-person (instructor-led) training course module for visual assessment which will include the HUD on-line course module. The participants will be recruited from the National Paint and Coatings Association (NPCA) database. Half of the respondents (approximately 200-250) will be participants in the in-person course (potentially 100 over three years) and will complete evaluation forms regarding their learning retention, preference for the format of training (the in-person versus an on-line module), and confidence in ability to

perform the physical and mental tasks involved. The other half will view the HUD on-line course module and complete the same evaluation instrument for a comparison study between the two groups. The evaluation instrument will be developed and pilot tested during months 6-8 of the first year of the project.

We will also collect similar information from participants who have previously taken the HUD on-line course (a general questionnaire will be sent to the NPCA to identify potential participants in this evaluation) and other on-line training courses through use of databases supplied by the National Center for Healthy Housing (NCHH): CEHRC visual assessment course and their pediatric home assessment course.

In both studies, participants will be incentivized to participate in the instructor-led, in-person courses by a \$25 travel reimbursement and snacks at the course.

[REDACTED] and [REDACTED] will be the staff handling this phase of the work, with consultation from [REDACTED]

In year two, we plan to have Mr. [REDACTED], capture the live training courses on digital video/audio tape for review and analysis of their appropriateness and effectiveness. These digital tapes will also be duplicated on CD or DVD for distribution to other Ohio Department of Health approved course providers to serve in the capacity of "train-the-trainer" aids.

#### Institutional Review Boards

The University of Cincinnati's Institutional Review Board (IRB) Assurance number is FWA00003152. We will apply for IRB review to determine if human subject protection is required for these studies. The application process is now electronically facilitated at the University of Cincinnati and the Principal Investigator and other key personnel are quite familiar with the process, having gone through it many times in the past. We anticipate a process time of around 1-2 months during the start-up phase of the project.

#### *(2) HUD Policy Priorities Addressed by This Study*

1. Improving our nation's communities: this study has the potential to improve and increase the use of important safe work practices for renovation and remodeling of housing in all communities throughout the U.S. (Lead-safe work practices can be used in all housing, not just low income housing.) All pre-1978 housing in the U.S. is potentially contaminated by lead-based paint. However, especially since the largest lead research projects ever funded by federal agencies including the United States Environmental Protection Agency (EPA), the Department of Housing and Urban Development (HUD), and the National Institute of Environmental Health Sciences (NIEHS):

- The Three Cities Soil Lead Abatement Demonstration Project;

- The Evaluation of the HUD Lead-Based Paint Hazard Control Program; and
- The Treatment of Lead-Exposed Children Succimer Trial,

it has been well established that intercity communities are particularly vulnerable to lead-based paint, lead dust, and lead-in-the soil contamination. The improvement of safe work practices for these renovation and remodeling projects will also translate into improvement in the living environment of the populations of these communities. In addition, increased ability by community groups as well as health and housing professionals to facilitate visual inspection for lead in housing will add to community capacity for shared knowledge on healthy housing. Accurate visual assessment of paint condition would better identify lead-based paint hazards which could trigger lead hazard control activities and thus contribute to improving communities' quality of life.

2. Providing Full and Equal Access to Grass-Roots Faith-based and other Community-based Organizations in Implementation: The University of Cincinnati will assess the one-hour classroom lead visual assessment course with outreach staff (as participants) from community-based agencies. This will include these agencies in implementation, as well as model the effectiveness of outreach staff participation in the effective visual assessment of lead hazards in community housing.

3. Participation of Minority-Serving Institutions in HUD Programs: The agencies chosen for participation in the one-hour classroom lead visual assessment course will be agencies that provide services to minorities in Hamilton County, Ohio. In particular, recruitment will be focused from two collaborations that involve agencies with home visitation programs to underserved populations in Hamilton County: The Hamilton County Lead Prevention Collaborative, and the Pathways Program of Greater Cincinnati. African Americans and Latino residents are the focus for services and care coordination by these agencies.

### *(3) Quality Assurance Mechanisms*

#### *a. Relevant quality assurance mechanisms:*

The data collected in this project will be entered into a Microsoft Access database developed by [REDACTED]. The data will then be imported into SAS (or other appropriate program) for final analysis.

Numerous procedures will be utilized to ensure the validity of the collected data. Data entry staff will be trained in appropriate procedures for reviewing completed survey forms prior to data entry. Obvious errors such as duplicate answers will be flagged to ensure those errors are not entered into the data base. The data entry system will incorporate range and logic checks to reduce the number of data entry errors. Computerized data files will be checked for data entry errors by an individual not performing the data entry.

Final data files will be submitted to HUD at the conclusion of the project. Paper and electronic files will be stored in the archive room in the Department of Environmental Health at the University of Cincinnati.

(b) Collection of data using instruments

Population samples will be solicited from a number of resources:

For *Study #1*: An Ohio Department of Health database of persons (1,200) who have successfully completed the Lead-Safe Renovators course will be used – this list is in the public domain. In addition, course participant lists from the University of Cincinnati training database and the In-Service Training, Inc. database (another Ohio-approved provider), and the database from the national Paint and Coatings Association (10,000) will be utilized. A survey instrument will be used to collect data needed for the comparison study (see sample draft in appendix). The survey instrument will be answerable anonymously and the consent to participate statement will be included on the survey instrument (which states that the return of the survey form signifies consent to use the respondent's answers as part of the aggregate results of the study). This survey instrument will be validated by expert review and by a pilot test of a small sample of persons who have taken one of the training offerings. (Please see letters of cooperation in the appendix section.)

The survey instrument will be accompanied by a monetary incentive. According to Church (1993)<sup>1</sup>, "prepaid cash rewards for completing surveys [have] the most significant impact on increasing response rates...." This monetary incentive will be in the amount of 2.00 USD.

A sample size of 500 provides excellent power to test the study question with multiple regression and will provide adequate power to explore some interactions. Power is .98 for a predictor contributing .025 to the  $R^2$ , with 8 other predictors in the equation accounting for an additional .20 in the  $R^2$  and an alpha equal to .05. Power is .99 and .997 for the predictor with contributions to  $R^2$  of .03 and .035, respectively. In calculating the power to test interaction effects, we conservatively assume an interaction divides the sample with a 40%:60% split, e.g., we might inquire whether or not our model applies equally for males and females. We then calculated power for the smaller subsample size, 200 (40% of 500), and 7 (one less) other predictors. Power is .69 for a predictor contributing .025 to the  $R^2$ , with 7 other predictors in the equation accounting for an additional .20 in the  $R^2$  and alpha equal to .05. Power is .77 and .83 for the predictor with contributions to  $R^2$  of .03 and .035, respectively.

Besides the evaluation of the efficacy of certain hands-on formats for the lead-safe renovator courses, a major outcome of study #1 is the development of a module based on Structured On-the-Job Training (SOJT) to be incorporated into the hands-on training for lead-safe work practices. [REDACTED] and [REDACTED] (both skilled in instructional

design) will be developing this module based upon the results of the evaluations and classroom feedback from participants.

For *Study #2*: We will be collecting evaluations of the various forms of visual assessment training (HUD's on-line, others' on-line, and a to-be-developed in-person course) via survey forms from participants retrospectively and well as immediately after completing one of the training offerings.

One of the major objectives of the second study is to develop a short in-person (instructor-led) training course module for visual assessment which will include the HUD on-line course module. The participants will be recruited from the National Paint and Coatings Association (NPCA) database. Half of the respondents (approximately 200-250) will be participants in the in-person course (potentially 100 over three years) and will complete evaluation forms regarding their learning retention, preference for the format of training (the in-person vs an on-line module), and confidence in ability to perform the physical and mental tasks involved. The other half will view the HUD on-line course module and complete the same evaluation instrument for a comparison study between the two groups. The evaluation instrument will be developed and pilot tested during months 6-8 of the first year of the project.

We will also collect similar information from participants who have previously taken the HUD on-line course (a general questionnaire will be sent to the NPCA to identify potential participants in this evaluation) and other on-line training courses through use of databases supplied by the National Center for Healthy Housing (NCHH): CEHRC visual assessment course and their pediatric home assessment course.

A sample size of 200 provides sufficient power to test the study question with multiple regression and will provide adequate power to explore some interactions. Power is .69 for a predictor contributing .025 to the  $R^2$ , with 7 other predictors in the equation accounting for an additional .20 in the  $R^2$  and alpha equal to .05. Power is .77 and .83 for the predictor with contributions to  $R^2$  of .03 and .035, respectively.

In both studies, participants will be incentivized to participate in the instructor-led, in-person courses by a \$25 travel reimbursement and snacks at the course. The incentive for the mailed surveys will be two \$1-bills sent with the survey. Church's 1993 literature review showed that incentives sent with the survey garner greater returns.

[REDACTED], and [REDACTED] will be the staff handling this phase of the work, with consultation with [REDACTED]

In year two, we plan to have [REDACTED], capture the live training courses on digital video/audio tape for review and analysis of their appropriateness and effectiveness. These digital tapes will also be duplicated on CD or DVD for distribution to other Ohio Department of Health approved course providers to serve in the capacity of "train-the-trainer" aids.

(c) Institutional Review Board:

The University of Cincinnati's Institutional Review Board (IRB) Assurance number is FWA00003152. We will apply for IRB review to determine if human subject protection is required for these studies. The application process is now electronically facilitated at the University of Cincinnati and the Principal Investigator and other key personnel are quite familiar with the process, having gone through it many times in the past. We anticipate a process time of around 1-2 months during the start-up phase of the project.

Informed consent will be obtained in two ways. For the in-class participants, the study will be verbally explained and a form distributed to be signed by the participants if they consent to participate. For the retrospective course participants, the survey instrument will contain an explanation as to the anonymous nature of their response and advising them that their return of the survey grants the University of Cincinnati their consent to use the information in aggregate form for study purposes only. If anyone in the in-class offerings wants the survey/evaluation to be read to him/her, the study coordinator would be able to do so. This will not, of course, be possible for the mailed surveys.

(4) Project Management Plan

Project Timeline with Benchmarks and Schedule of Deliverables:

*Study #1 – Efficacy of Hands-on Skills Format for Learning Transfer*  
Year One:

Month #1	Month #2	Month #3	Month #4	Month #5	Month #6	Month #7	Month #8	Month #9	Month #10	Month #11	Month #12
Development of SCUT module for incorporation into H-G modules of lead safe work practices training. [redacted] and [redacted]			Quarterly report [redacted]			Quarterly report [redacted]			Quarterly report [redacted]		
[redacted] [redacted] [redacted]			Surveys mailed to database lists and given to course participants. [redacted] and [redacted]				Surveys continue at courses – plus returned survey results entered into database for analysis. [redacted] and [redacted]				
Purchase Equip. & Supplies [redacted]	Submit Quality Assurance Program [redacted]										
IRB Submission & Review Process [redacted]											

Year Two:

Month #1	Month #2	Month #3	Month #4	Month #5	Month #6	Month #7	Month #8	Month #9	Month #10	Month #11	Month #12
Quarterly report [redacted]			Quarterly report [redacted]			Quarterly report [redacted]			Quarterly report [redacted]		
Surveys continue at courses – plus returned survey results entered into database for analysis. [redacted] and [redacted]											



Year Three:

Month #1	Month #2	Month #3	Month #4	Month #5	Month #6	Month #7	Month #8	Month #9	Month #10	Month #11	Month #12
Quarterly report			Quarterly report			Quarterly report			Quarterly report		
Surveys continue at courses – plus returned survey results entered into database for analysis.						Data analysis for final report.			Final Report and Manuscript Preparation and Submission.		

*Study #2 – A comparison of the HUD on-line visual assessment for lead paint hazards training courses with other selected training classes/formats for learning transfer.*

Year One:

Month #1	Month #2	Month #3	Month #4	Month #5	Month #6	Month #7	Month #8	Month #9	Month #10	Month #11	Month #12
Survey instrument development and pilot testing.			Quarterly report			Quarterly report			Quarterly report		
Recruitment and coordination of 200-250 students to complete the HUD on-line Visual assessment course.											
Development of 1-hour classroom visual assessment course.									Recruitment and facilitation of 200 trainees to complete the one-hour classroom lead visual assessment course.		

Year Two:

Month #1	Month #2	Month #3	Month #4	Month #5	Month #6	Month #7	Month #8	Month #9	Month #10	Month #11	Month #12
Returned survey results and evaluations from courses (classroom and HUD on-line) entered into database for analysis and [REDACTED]											
Quarterly report [REDACTED]			Quarterly report [REDACTED]			Quarterly report [REDACTED]			Quarterly report [REDACTED]	Digital capturing of one-hour visual assessment classroom course. [REDACTED]	
Recruitment and facilitation of 200-250 trainees to complete the one-hour classroom lead visual assessment course. [REDACTED]											

Year Three:

Month #1	Month #2	Month #3	Month #4	Month #5	Month #6	Month #7	Month #8	Month #9	Month #10	Month #11	Month #12
Quarterly report			Quarterly report			Quarterly report			Quarterly report		
Surveys continue at courses – plus returned survey results entered into database for analysis. Final revisions made to classroom course based on evaluations.						Data analysis for final report. Final production of one-hour course.			Final Report and Manuscript Preparation and Submission.		

Final Report: Months 1-2 after completion of grant period.

(5) Budget Proposal (please refer to budget proposal and justification separate documents)



## **RATING FACTOR 4**

### **(2) (d) Leveraging Resources**

This application does not include securing other public and/or private resources (other than the use of population databases from public and private entities), however, it does propose to capitalize on the ability to integrate several aspects of the projects' activities into an existing robust continuing education program. The University of Cincinnati's lead training program has been in existence for over 18 years. This program was one of the original six U.S.EPA Regional Lead Training Programs. As such, it enjoys the benefits of a healthy network of lead training providers to facilitate exchange of ideas and processes. Trainers are available to this program who are already highly trained and currently up-to-date on training techniques, content and regulatory requirements. In addition, administrative functions are in place (including registration systems, duplication systems, electronic database resources, etc.).

This established program will allow the proposed projects to "get off the ground" quickly and in a cost-efficient manner. The research expertise of [REDACTED] and [REDACTED] and [REDACTED] enable the cost efficiency of in-house personnel rather than contracted research companies.

## **RATING FACTOR 5**

### **(2) (e) Achieving Results and Program Evaluation**

**Please refer to the benchmarks and milestones identified in the management plan in Rating Factor 3.**

The outcomes, benchmarks, and milestones for this proposal are described in this section and summarized in the eLogic Model submitted with this application.

The proposed project covers the 36-month period from November 1, 2008 to October 31, 2011.

#### ***Study #1:***

**Program Outcome One:** Development of Structured On the Job Training (SOJT) module for incorporation into the hands-on modules of lead safe work practices training courses. Year one: months 1-3.

*Benchmark #1.1: Familiarize staff with SOJT principles utilizing models identified in the current literature (e.g., "Pete Blair's Technical Training Tips"; [www.petebclair.com](http://www.petebclair.com)).*

*Benchmark #1.2: Develop module.*

*Benchmark #1.3: Pilot test module.*

*Benchmark #1.4: Incorporate model into U.C.-delivered LSR/EMP training courses.*

**Program Outcome Two:** Study #1 Survey Instrument completed and pilot tested. Year one; months 1-3.

*Benchmark #2.1: Complete the survey instrument (see supporting documents section).*

*Benchmark #2.2: Pilot test survey instrument.*

**Program Outcome Three:** Purchase start up equipment and supplies for training courses. Year one; month 1.

**Program Outcome Four:** Complete and submit Quality Assurance Plan for project. Year one; month 2.

**Program Outcome Five:** Complete and submit Institutional Review Board application for approval. Year one; months 1-3.

*Benchmark #5.1: Submit application – month #1*

*Benchmark #5.2: Answer questions, make revisions, as needed/requested by IRB office – months #2-3*

**Program Outcome Six:** Outreach and education sessions (LSR/EMP). Years 1-3; months 1-36.

*Benchmark #6.1: Students recruited for participation*

*Benchmark #6.2: Ten – twelve courses held per year averaging 10 participants each.*

**Program Outcome Seven:** Study #1 surveys mailed to database lists and given to classroom course participants for completion. Year one: months 4-7.

**Program Outcome Eight:** Survey responses entered into database for later analysis. Years 1-3; months 8-30.

**Program Outcome Nine:** Data analysis for final report on Study #1. Year 3; months 31-33.

**Program Outcome Ten:** Final Report and Manuscript preparation for submission. Year 3; months 34-36.

**Program Outcome Eleven:** Quarterly and final reports. Years 1-3; months 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, and 1-2 months after project close for final report.

## ***Study #2***

**Program Outcome One:** Survey instrument development and pilot testing. Year 1; months 1-3.

*Benchmark #1.1: Complete the survey instrument.*

*Benchmark #1.2: Pilot test survey instrument.*

**Program Outcome Two:** Development of 1-hour classroom visual assessment course. Year 1; months 1-9.

*Benchmark #2.1: Review all available existing visual assessment course curricula.*

*Benchmark #2.2: Develop course.*

*Benchmark #2.3: Pilot test course with small student sample.*

**Program Outcome Three:** Surveys mailed to database lists and given to students who are recruited to completed the HUD on-line Visual Assessment course and the classroom 1-hour course. Year 1; months 4-12.

**Program Outcome Four:** Recruitment and coordination of 200-250 students to complete the HUD on-line Visual Assessment course. Years 1-3; months 1-30.

*Benchmark #4.1: Students recruited to complete training course.*

*Benchmark #4.2: Ten courses completed in each of years 2 and 3 with approximately 10 trainees in each course.*

**Program Outcome Five:** Recruitment and facilitation of 200-250 trainees to complete the one-hour classroom lead visual assessment course. Years 1-3; months 1-30.

*Benchmark #5.1: Students recruited to complete training course.*

*Benchmark #5.2: Ten courses completed in each of years 2 and 3 with approximately 10 trainees in each course.*

**Program Outcome Six:** Returned survey results and evaluations from courses (classroom and HUD on-line) entered into database for analysis. Years 2-3; months 13-30.

**Program Outcome Seven:** Digital capturing of one-hour visual assessment classroom course. Year 2; months 23-24.

**Program Outcome Eight:** Data analysis for final report. Year 3; months 31-33.

**Program Outcome Nine:** Final production completed for one-hour course in digital format. Year 3; months 31-33.

*Benchmark #9.1: Key personnel make final edits/changes as needed.*

*Benchmark #9.2: Course is downloaded onto either CD or DVD and duplicated for distribution.*

**Program Outcome Ten:** Final Report and Manuscript preparation for submission. Year 3; months 34-36.

**Program Outcome Eleven:** Quarterly and final reports. Years 1-3; months 4, 7, 10, 13, 16, 19, 22, 25, 28, 31, 34, and 1-2 months after project close for final report.

**Identify potential obstacles to meeting study objectives:**

One possible obstacle might be designing to include the new U.S. EPA LSR Training Rule and Requirements into development of the SOJT module to comply with the new EPA LSR Training Rule and Requirements. Response Steps: We have very good

working relationships with both ODH and the U.S.EPA enabling us to plan appropriate compliance review meetings with them as the modules are developed.

**Plans to Deal with Benchmarks Not Achieved:**

Progress towards Benchmark achievement will be carefully monitored. Adequate resources are available to meet all benchmarks including populations of potential course participants, training facilities, instructional design specialists, instructors, expertise in the method being investigated, and adequate management skills. Project evaluation will occur at many points in time, in particular when progress is compared to stated benchmarks in the process of preparing the quarterly reports and at the periodic meetings of project staff and consultant/advisors.

## **Rating Factor 6**

### **(2) (f) BONUS POINTS**

The City of Cincinnati, where the University of Cincinnati is located, has an Empowerment Zone called "Cincinnati Urban Round 2 Empowerment Zone as is documented in the enclosed Certification of Consistency with RC/EZ/EC II's Strategic Plan.

## BIOGRAPHICAL SKETCH

NAME <div style="background-color: black; width: 100px; height: 20px; margin-top: 5px;"></div>	POSITION TITLE Field Service Professor
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EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(If applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Cincinnati, Ohio	BA	1986	Communication
University of Cincinnati, Ohio	MA	1987	Communication
University of Cincinnati, Ohio	Ed.D.	1994	Curriculum & Instruction Adult Training

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications.

### WORK EXPERIENCE

1977-1980: Part-time & full-time undergraduate student; 1965-1984: Executive Assistant & Secretarial positions; 1984-1987: Full-time undergraduate & graduate student; 1987-1988: Research Associate/Special Projects Assistant, Graduate Studies & Research Division, University of Cincinnati; 7/88-1/91: Field Service Instructor/Manager, Asbestos Training Program, Department of Environmental Health, University of Cincinnati; 2/91-8/95: Field Service Assistant Professor/Director, Educational Resource Center Continuing Education & Outreach Program, Department of Environmental Health, University of Cincinnati; 8/95-present: Field Service Associate Professor/Director, Educational Resource Center Continuing Education & Outreach Program, Department of Environmental Health, University of Cincinnati; 7/97 – 9/00: Director, Graduate Studies, Department of Environmental Health, University of Cincinnati, 9/00 – present: Director, Continuing Medical Education Admin., University of Cincinnati College of Medicine/Field Service Professor, Dept. of Environmental Health, Director, NIOSH/UC Education & Research Center Continuing Education Pro.

### HONORS

1979-1986: Deans' Lists (4.0 GPA); McLennan Comm. College & University of Cincinnati; 1979-87: Academic Scholarships from McLennan & University of Cincinnati; 1985-86: Academic scholarship from Cincinnati Women's Club; 1986: *Summa Cum Laude*/High Honors in Communication, Phi Beta Kappa; 1986-87 University Graduate Teaching Assistantship. (1986 - 87); International Who's Who of Professionals (1997 & 1998); AIHA Committee Award for Outstanding Service to the Communication & Training Methods Committee Over the Last Five Years (May 2004 & May 2005); Outstanding Faculty Bonus Awards 2006 & 2007.

### COMMITTEES 1990 to present:

1995-96 and 2000-02, President, BECO; Chair, Risk Communication & Training Methods Committee, AIHA; 1993 and 1996, President, NIOSH ERC/CE Directors Group; 1993 & 1997, Chair, Lead Regulations Committee, BECO; 1992-present, Vice Chair, NUCEA Council for CE in the Professions & Liberal Arts; 1991-92, Chair, NUCEA Division of Environmental Health & Safety Programs; 1990-93, Board of Trustees, Building Environment Council of Ohio (BECO); 1996-2008, Vice Chair, City of Cincinnati Advisory Committee to Prevent Childhood Lead Poisoning. BioDefense Work Group, University of Cincinnati 2003-04.

## **PUBLICATIONS:**

- Jarrell, J. "Operations & Maintenance Programs for Industrial & Commercial Applications, ECON Environmental Contractor Magazine, Special Issue - 1990, pp. 14-18.
- Jarrell, J. "How to Identify Good Asbestos Worker Training Courses," Asbestos Abatement, Volume 5, 1991, pp. 205-228, Peters & Peters, Eds.
- Jarrell, J. "An Overview of Lead Abatement Guidelines & Regulations" (a three part series), Ohio Asbestos Report, Volume 4, Number 6, Mar/Apr 1992, Volume 5, Number 2, Jul/Aug 1992, and Volume 5, Number 4, Nov/Dec 1992.
- Jarrell, J. "Regulated Mandatory Continuing Education and Transfer/Implementation of Learning," National Library Microfilm/Microfiche and Abstracts, July, 1994.
- Jarrell, J. "Regulatory Review," The Lead Paint Primer, 2nd. Ed., 1995, pp. 159-171
- Jarrell, J. "Communicating with Empowered Employees," The Transfer Agent, Volume 1, Iss. 1, 4th Qtr. 1995.
- Jarrell, J. "So I Have to Train My Workers...Now What?" Ohio Building Environment Report, Vol. 4, Number 3, May/June, 1996.
- 
- Jarrell, J., Richards, R. "Chapter 12. Evaluating a Safety, Health, and Environmental (SHE) Training Program," Industrial Hygiene Performance Metrics, AIHA Press, 2001.
- Jarrell, J. "Proceedings of: Applications of Human Performance in Health & Disability International Conference," editor.
- Jarrell, J. Ohio Building Environment Report, editor and principal contributor, April, 1997 through 2004.
- Cardiology Review, educational editor for Continuing Medical Education units, September, 1998 through present.
- Jarrell, J. "A Study of Long-Term Learning Outcomes Transfer—For OSHA Outreach Train-the-Trainer Courses," *Chemical Health & Safety*, Harry J. Elston, Editor, Nov-Dec. 2004.
- Genaidy, A, Karwowski, W, Salems, S, Jarrell, J, Paez, O. Tuncel, S. "The Work Compatibility Improvement Framework: Defining and Measuring the Human-at-Work System,". Journal for Human Factors & Ergonomics in Manufacturing, March/April, 2007.
- Jarrell, J., O'Neill, D., Hasse, L. A Clinical Research Training Efficacy Study With a Comparison of Subjects who did and Did Not Use Learning Within Four Months of Training, *Journal of Chemical Health & Safety*, 2008 In Press.



## BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.  
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

<b>NAME</b> [REDACTED]		<b>POSITION TITLE</b>	
<b>eRA COMMONS USER NAME</b> [REDACTED]		Professor of Environmental Health	
<b>EDUCATION/TRAINING</b> (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
<b>INSTITUTION AND LOCATION</b>	<b>DEGREE</b> (if applicable)	<b>YEAR(s)</b>	<b>FIELD OF STUDY</b>
Antioch College	B.S.	1961	Engineering Science
Johns Hopkins University	M.S.		
	Engineering	1963	Environ. Eng. Science
Johns Hopkins University	Ph.D.		
	Engineering	1965	Environ. Eng. Science

### A. Positions and Honors

#### Positions and Employment

1965-1967 Staff Engineer, Ohio River Valley Water Sanitation Commission, Cincinnati, OH  
1967-Present Department of Environmental Health, University of Cincinnati Professor (since 1985); Associate Professor (1976-1985); Assistant Professor (1970-1976); Senior Research Associate (1967-1969)  
1981 Guest Research, Institute for Hygiene, University of Gothenburg, Sweden  
1988-Present Director, Division of Environmental & Industrial Hygiene, Department of Environmental Health, University of Cincinnati, Cincinnati, OH  
1991-1994 Deputy Director, University of Cincinnati, NIOSH Education and Research Center  
1991-1997 Director, Great Lakes Regional Lead Abatement Training Center  
1993-Present Adjunct Professor of Industrial Engineering, Department of Mechanical, Industrial and Nuclear Engineering, University of Cincinnati, Cincinnati, OH  
1995 Visiting Scholar, School of Public Health, University of California (Berkeley), Berkeley, CA  
1994- Present Director, University of Cincinnati National Institute for Occupational Safety and Health (NIOSH) Educational and Research Center

#### **SELECTED PROFESSIONAL ACTIVITIES**

- Member of Program Advisory Committee to establish a masters level industrial hygiene program at the Sardar Patel University in Gujarat, India, 1996 to present.
- Member of Advisory Committee for Postgraduate and Masters Training in Occupational and Environmental Hygiene in Poland/Upper Silesia, 1996 to present
- Member, International committee, American Conference of Governmental Industrial Hygienist, 1999-present.
- 2003 Visiting Lecturer, St. Johns Medical College, Bangalore INDIA and Singapore Polytechnic, SINGAPORE
- Fulbright Senior Specialist, Gliwice, Poland, 2004

#### **CONTINUING EDUCATION/COURSES TAUGHT** (selected)

- Lead Abatement Training for Supervisors and Contractors. Development of Model Materials for U.S. Environmental Protection Agency, Office of Toxic Substances. 1991-1992, Revised 1996-1997.
- Demonstration of Use of Portable X-Ray Fluorescence Analyzers for Analysis of Lead and Other Metals in Soil, Dust, Air, and Paint Samples: week long training courses at St. John's Medical School, Bangalore, INDIA in January 2003, at Singapore Polytechnic (3-days) in Singapore May 2003

### B. Selected peer-reviewed publications

- Thomson CF, Poppe B, Clark, CS, Rice, CH, and Linz D, (1992) "Development and Implementation of a Safety and Health Program for Employees Involved with Residential Lead Abatement and Monitoring", *Appl. Occup. and Environ. Hyg.*, 7(6): 398-404.
- Ewers L, Clark S, Menrath W, Succop P and Bornschein R (1994). Clean-up of Lead in Household Carpet and Floor Dust, *Am. Ind. Hyg. Assoc. J.*, 55(7): 650-657.
- Clark S, Bornschein R, Pan W, Menrath W and Roda S (1995). An Examination of the Relationships between the HUD Floor Lead Loading Clearance Level for Lead-Based Paint Abatement, Surface Dust Lead by a Vacuum Collections Method and Pediatric Blood. *Applied Occup. Environ. Hyg.* 10(2): 107-108.
- Clark S, Bornschein R, Pan W, Menrath W, Roda S and Grote J (1996). The Relationship Between Surface Dust Lead Loadings on Carpets and the Blood Lead of Young Children, *Environ. Geochem. & Health*, 18: 143-146.
- Morley J C, Clark C S, Deddens J A, Ashley K and Roda S, (1999). Evaluation of a Portable X-Ray Fluorescence Instrument for the Determination of Lead in Workplace Air Samples. *Appl. Occup. & Environ. Hyg.* 14: 306-316.
- Clark S, Menrath W, Chen M, Roda S, Succop P (1999). Use of a field portable X-Ray Fluorescence analyzer to determine the concentration of lead and other metals in soil samples, *Ann Agric. Environ. Med.* 6: 27-32.
- Clark S, Chen M, McLaine P, Galke W, Menrath W, Buncher R, Succop P, Dixon S (2002) Prevalence and Location of Teeth Marks Observed During XRF Testing of Dwelling in the National Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program, *Applied Occupational and Environmental Hygiene* 17: 628-633, 2002.
- Tohn E, Dixon S, Wilson J, Galke W, Clark S (2003) An Evaluation of One-time Professional Cleaning in Homes with Lead-Based Paint Hazards, *Applied Occupational and Industrial Hygiene* 18: 138-143.
- Clark S, Menrath W, Chen M, Succop P, Bornschein R, Galke W, Wilson J (2004) The Influence of Exterior Dust and Soil Lead on Interior Dust Lead Levels in Housing Which Had Undergone Lead-Based Paint Hazard Control, *Journal of Occupational and Industrial Hygiene* 1: 273-282
- Kuruvilla A, Pillay V V, Venkatesh T, Adhikari P, Chakrapani M, Clark C S, D'Souza H, Menezes G, Nayak N, Clark R, Sinha S (2004) Use of a Field Portable X-Ray Fluorescence Analyzer in an Investigation of the sources of lead in the environments of school children with elevated blood lead in Mangalore, India. *Indian Journal of Pediatrics*, 41: 495-499.
- Clark CS, Menrath W, Chen M, Succop P, Bornschein R, Galke W, Wilson J: The Influence of Exterior Dust and Soil Lead on Interior Dust Lead Levels in Housing That Had Undergone Lead-Based Paint Hazard Control. *Journal of Occupational and Environmental Hygiene*, 1:273-282, 2004.
- Succop P, Clark CS, Chen M, Galke W. Imputation of Data Values that are Less Than a Detection Limit (2004), *J. Occupational and Environmental Hygiene*, 1: 436-441.
- Clark CS, Grote J, Wilson J, Succop P, Chen M, Galke W, McLaine P (2004), Occurrence of Determinants of Increases in Blood Lead Levels in Children Shortly After Lead Hazard Control Activities. *Environmental Research*, 96:196-205.
- Clark CS, Thuppil V, Clark R, Sinha S, Menezes G, D'Souza H, Nayak N, Kuruvilla A, Law T, Dave P, Shah S, (2005): Lead in paint and soil in Karnataka and Gujarat, India. *Journal of Occupational and Environmental Hygiene*, 2:38-44.
- Dixon SL, Wilson JW, Clark CS, Galke, WA, Succop PA, Chen, M. (2005) Effectiveness of Lead-Hazard Control Interventions on Dust Lead Loadings: Findings from the Evaluation of the HUD Lead-Based Paint Hazard Control Grant Program, *Environmental Research*, 98: 303-314.
- Galke W, Clark CS, McLaine P, Bornschein R, Wilson J, Succop P, Roda S, Breyse J, Jacobs D, Grote J, Menrath W, Dixon S, Chen M, Buncher R (2005) National evaluation of the US department of housing and urban development lead-based paint hazard control grant program: *Environmental Research*, 98:315-328.
- Clark CS, Grote J, Wilson J, Succop P, Chen M, Galke W, McLaine P (2005) Occurrence of determinants of increases in blood levels in children shortly after lead hazard control activities. *Environmental Research*, 96:196-205.
- Dixon SL, Wilson JW, Clark CS, Galke WA, Succop PA, Chen M (2005) The influence of common area lead hazard and lead hazard control on dust lead loadings in multi-unit buildings, *Journal of Occupational Environmental Hygiene*, 2:659-66.

- Clark CS, Rampal KG, Thuppil V, Chen C, Clark R, Roda S (2005) The lead content of currently available new residential paint in several Asian countries, *Environmental Research*, in press.
- Clark CS, Rampal KG, Thuppil V, Chen C, Clark R, Roda S (2006) The lead content of currently available new residential paint in several Asian countries, *Environmental Research*, 102:9-12.
- Wilson J, Pivetz T, Ashley P, Jacobs D, Strauss W, Menkedick J, Dixon S, Hsing-Chuan Tsai, Brown V, Friedman W Galke W, Clark S (2006), "Evaluation of HUD-funded lead hazard control treatments at 6 years post-intervention", *Environmental Research*, 102: 237-248.
- D'Souza S H, Menezes G, Clark C S and Thuppil V (2006) Health Hazards by Lead Exposure: Evaluation Using ASV and XRF, *Toxicology and Industrial Health* 22:249-254.
- Adebamowo E O, Clark C S, Roda S, Agbede O A, Sridhar M K C, Ademamowo C A (2007), Lead Content of Dried Films of Domestic Paint Currently Sold in Nigeria, *Sci Total Environ*. 388: 116-120.
- Markey A M, Clark C S, Succop P A and Roda S (2008), Determination of the Feasibility of Using a Portable X-Ray Fluorescence Analyzer in the Field for Measurement of Lead Content of Sieved Soil, *J Environmental Health*. 70: 24-29.

### C. Current Research

#### Active

-IT420H008432-01 [REDACTED] Education and Research Center, NIOSH 7/1/05-6/30/10 Interdisciplinary graduate education and research, continuing education and outreach in Biomonitoring, environmental and occupational hygiene, occ'l. and env'l medicine, occ'l health nursing, occ'l safety and health engineering, hazardous substances academic training and pilot research project training program.	\$6,621,790 4 %
-OHLHT 0163-07 [REDACTED] 11/1/07 to 9/30/09 Evaluating the Influence of Exterior Dust, Soil Lead and Interim Soil Lead Hazard Control Treatments on Interior Dust Lead Levels Utilizing the Existing HUD Evaluation Database"	\$242,910 10 %
-OHLHT 0113-06 [REDACTED] 11/01/06 to 4/30/09 HUD Determining the Longevity of the Effectiveness of Interim Soil Lead Hazard Controls in Reducing Exterior and Interior Dust Lead Levels and Assessing the Relative Contributions of Soil and Exterior Dust Lead Reservoirs to Interior Dust Lead Using Multi-elemental Analysis with XRF.	\$420,600 10 %
-212-2005-M-11911 [REDACTED] 4/05-3/08 -US-INDO Joint Working Group on Environmental and Occupational Health Assessment of Feasibility of Dust Control Devices for Small Silica Flour Milling Units in India Evaluate the effectiveness of various interventions in reducing exposures to silica in several facilities.	\$35,000 2%
-U59/CCY323294-01 [REDACTED] Via National Center for Health Housing (Columbia, MD) 11/03-9/07 Development of a National Healthy Homes Training Center and Network; Centers for Disease Control and Prevention	\$247,881 5%
-OHLHT0106-05 [REDACTED] 10/1/05-9/30/08 HUD Longevity of Effectiveness of Interim Soil Lead Hazard Control Measures and Influencing Factors	\$420,600 10 %
-58-3148-7-034 US Dept Agriculture 11/0/2006 to 10/31/09 Lead Exposure Assessment of a Population Living near a Secondary Lead Smelter. Assess the lead levels in dust, soil and paint in and near about 150 houses in the vicinity of a secondary lead smelter in Cairo Egypt using field portable X-Ray Fluorescence analysis with quality control samples analyzed by atomic absorption.	\$35,055 0 %

## BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.  
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME [REDACTED]		POSITION TITLE Senior Research Associate	
eRA COMMONS USER NAME			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
University of Cincinnati	BS	1964-1969	Biological Sciences
University of Cincinnati	MS	1969-1971	Population Genetics

**A. Positions and Honors.** List in chronological order previous positions, concluding with your present position. List any honors. Include present membership on any Federal Government public advisory committee.

1988 – 2008 Department of Environmental Health, University of Cincinnati

### Current Responsibilities and Projects:

Principal Investigator -	Testing and Improving the Accuracy of a Commercially Available Wipe Method Used to Test for Lead in Settled Dust - Responsible for project management, scientific integrity of research component, and data management.
Project Manager-	Evaluating the Influence Exterior Dust Lead, Soil Lead, and Interim Soil Lead Hazard Control Treatments on Interior Dust Lead Levels Utilizing the Existing HUD Evaluation Database - Responsible for project management, scientific integrity of research component, and data management.
Project Manager-	Assessing the Relative Contribution of Soil and Exterior Dust Lead Reservoirs to Interior Dust Lead Loading - Responsible for project management, scientific integrity of research component, and data management.

### Prior Projects and Responsibilities:

Technical Writer -	USEPA Lead Project Designer Curriculum Project - Responsible for writing USEPA training manual.
Project Manager -	Evaluation of Portable XRF Instrumentation used to Test for Lead in Surface Wipes -HUD - Responsible for experimental design and project management
Project Manager -	Cincinnati Abatement Project – Cincinnati Health Department - Responsible of evaluation of project
Instructor & Course Director -	USEPA Regional Lead Training Center
Technical Writer -	USEPA Lead Abatement Training for Contractors and Supervisors Curriculum Project
Environmental Manager -	Treatment of Lead-Exposed Children Project – NIEHS - Responsible for oversight of environmental assessments and interventions
Technical Consultant -	Aspen Environmental Lead Study – Aspen-Pitkin County Environmental Health Department

Project Manager for the following field studies:

Magna Environmental Lead Study - Kennecott  
Sandy Environmental Lead Study - ASARCO

Principal Investigator/Program Director (Last, first, middle):

Salt Lake Environmental Lead Study – ARCO / Kennecott  
Anaconda Environmental Arsenic Study - ARCO  
Lake County Lead Exposure Prevention Project - ASARCO  
Butte-Silver Bow Environmental Health Lead Study - ARCO  
Midvale Community Lead Survey

Environment & Abatement Manager - Cincinnati Soil/Lead Abatement Demonstration Project - USEPA

1988 Instructor - Hocking Technical College  
1978 – 1988 Partner/Manager - A & M Construction  
1974 – 1978 Teacher - Cincinnati Public Schools

**B. Selected peer-reviewed publications (in chronological order).** Do not include publications submitted or in preparation.

Clark, C.S., Bornschein, R.L., Pan, W., Menrath, W.G., Roda, S. and Grote, J. 1996. The Relationship Between Surface Dust Lead Loadings on Carpets and the Blood Lead of Young Children, Environ. Geochem. And Health, 18:143-146.

Clark, C.S., Bornschein, R.L., Pan, W., Menrath, W.G., and Roda, S. 1995. An Examination of the Relationships Between the U.S. Department of Housing and Urban Development Floor Lead Loading Clearance Level for Lead-Based Paint Abatement, Surface Dust Lead by a Vacuum Collection Method, and Pediatric Blood Lead. Applied Occup. Environ. Hyg. 10:107-110.

Ewers, L., Clark, C.S., Menrath, W.G., Succop, P.A., Bornschein, R.L. 1994 Clean-Up of Lead in Household Carpet and Floor Dust, Am. Ind. Hyg. Assoc. J. 55:650-656.

**C. Research Support.** List selected ongoing or completed (during the last three years) research projects (federal and non-federal support). Begin with the projects that are most relevant to the research proposed in this application. Briefly indicate the overall goals of the projects and your role (e.g. PI, Co-Investigator, Consultant) in the research project. Do not list award amounts or percent effort in projects.

Research Support:

Ongoing

OHLHT0157-07 11/1/07 – 10/30/09

HUD

Testing and Improving the Accuracy of a Commercially Available Wipe Method Used to Test for Lead in Settled Dust

Objectives: The objective of this project is to investigate the accuracy of a commercially available wipe for testing the amount of lead in interior settled dust and if necessary improve the accuracy.

Role: Principal Investigator

OHLHT0163-07 11/1/07 – 10/30/09

HUD

Evaluating the Influence Exterior Dust Lead, Soil Lead, and Interim Soil Lead Hazard Control Treatments on Interior Dust Lead Levels Utilizing the Existing HUD Evaluation Database

Objectives: The overall objective of this project is to increase the number of units available for statistical analyses in the HUD Evaluation data base for housing for which exterior dust and soil lead data are available by over 100%.

Role: Project Manager

Principal Investigator/Program Director (Last, first, middle):  
11/1/06 – 4/30/09

OHLHT0113-06  
HUD

Assessing the Relative Contribution of Soil and Exterior Dust Lead Reservoirs to Interior Dust Lead Loading  
Objectives: The objective of this technical study is to investigate the longevity of effectiveness of interim soil lead hazard controls in reducing exterior and interior dust lead loading levels in 150 houses in Cuyahoga County, OH where the interventions had occurred six to ten years earlier through HUD Lead Hazard Control Grants to the Cleveland and Cuyahoga County Health Departments. A second objective is to assess the contribution of soil and exterior dust lead reservoirs on interior dust lead levels.

Role: Project Manager

OHLHT0106-05      10/1/05 – 9/30/08  
HUD

Longevity of Effectiveness of Interim Soil Lead Hazard Control Measures and Influencing Factors

Objectives: The objective of this technical study is to examine housing where soil lead hazard control had previously been implemented through HUD Lead-Based Paint Hazard Control Grant Program to determine the longevity of soil lead hazard control treatments, differences among treatment types and factors associated with treatment failure.

Role: Project Manager

### Completed

OHLHR 0063-99      3/1/2000 – 12/31/2003  
HUD

Evaluation of Exterior Lead Reduction and Control Methods

Objectives: Investigate different strategies for controlling and reducing levels of lead-contaminated dust on public sidewalks. Those strategies included stabilizing the paint on building facades, sweeping public sidewalks with specialized equipment, and enhanced building code enforcement.

Role: Project Manager

OHLHR 0054-99      9/13/1999 – 3/12/2003  
HUD

Use of a Field Portable X-Ray Fluorescence Analyzer to Reduce Clearance Dust Wipe Failure Rates

Objectives: Provide instant results from wipe testing to lead abate workers performing final cleaning on lead abatement sites. Workers could continue to clean if on-site testing indicated that there would be a high probability of clearance failure. Would using this technology result in fewer clearance failures?

Role: Project Manager

OHLHR 0010-95      7/1/1995 – 6/30/2003  
HUD

Development and Distribution of a Public Use Data Set

Objectives: Develop a data set from data collected as part of a major research project suitable for distribution to researchers and agencies consistent with regulations regarding confidentiality of medical and personal information. The data were collected at fourteen grantee site by grantees enrolled in the HUD program for the reduction of lead hazards in privately-owned, low-income housing.

Role: Project Manager & Programmer

## BIOGRAPHICAL SKETCH

NAME [REDACTED]		POSITION TITLE Research Associate	
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (If applicable)	YEAR(s)	FIELD OF STUDY
University of Cincinnati	Bachelor	1994	Information Systems
University of Cincinnati	Associate	1989	Programming

### WORK EXPERIENCE

2000-         Manager of Information Technology/ Audio Visual, Department of Environmental Health, Univ. of Cincinnati  
1996-2000 Systems Administrator, Department of Molecular Genetics, Microbiology, Biochemistry, Univ. of Cincinnati  
1989-1996 Programmer, Cincinnati Gear Co., Cincinnati Ohio  
1988-1989 Lab Consultant, University College, University of Cincinnati

### AWARDS

2005 Quality Service Initiate-Service Enhancement Grants through the Univ. of Cincinnati Quality Service Initiative

### COMMITTEES

Information Technology Committee for the Department of Environmental Health  
Network Managers Committee for the College of Medicine  
Industrial Advisory Committee for Computer Network Engineering Technology for Cincinnati State College  
UC Physicians Re-Engineering Initiative

### ACHIEVEMENTS:

Strategic planning of revenue generating opportunities. Developed audio/visual services for capturing and formatting departmental lectures as marketable training resources, as well as offering services to other departments and organizations within the university.

Project management of all video productions of online classes offered by the department. Lectures are stored on department's media server and are accessed through Blackboard. Evaluate video utilization with faculty and students to determine best practices and allocations of service/resources.

Direct departmental decisions and implementation of new technology; provide supplemental training to faculty and staff.

Design and manage Windows 2003 servers: File and Print Sharing, Web, Active Directory, SharePoint, Sequel and special application servers. Includes all aspects of hardware and software related to servers, such as: Data backup, Security control, Network monitoring, Disaster Recovery Procedures.

Originate and execute web based data applications. Created a grant database application which processes and tracks all grants and related activities within the department. Additional applications created include: PC Inventory, Graduate/Alumni tracking, and a Helpdesk Ticket system.

Design and administer web sites for the department; 26 sites developed to date.

Manage all aspects of 450 personal computers within the department.

Implementation of IT Co-Op program with the Department of Environmental Health.

Manage IT technicians responsible for Level 1 and Level 2 support to faculty, staff and students.



## **Biographical Sketch**

### **The University of Cincinnati**

#### **Program Coordinator (Part time) – Center for Continuous Professional Development Health & Safety Training (2006 – Present)**

Responsible for coordinating Education & Research Center (ERC) conferences throughout the United States and Canada; also coordinates course logistics, catering and budget preparations for special events as well as processing OSHA trainer card requests.

### **The University of Cincinnati - 1981-2004**

#### **Program Coordinator - Continuing Medical Education** (1988 – 2004)

- Implemented a color-coded course evaluation eliminating repetitious copies which significantly reduced copier usage and paper waste by 50%.
- Designed an early registration policy offering 10% discounts while significantly reducing time spent revamping formalized documents.
- Coordinated a job sharing system independently assuming management of safety programs leveraging individual coworker's workload.
- Designed a system to track four major exhibits collecting and shipping information from 15 research centers discarding outdated material prior to shipment reducing costs by 30%.
- Observed and recommended the termination of an annual environmental health and safety institute that was consistently receiving low responses, but incurring major marketing expenses. There was a substantial savings in marketing and advertising expenses as a result of the discontinued program.

#### **Training Coordinator - Employee Services & Training** (1985 – 1988)

- Presented communication skills workshops for groups of 15-20 participants, readily engaging audience and generating lively group discussion.
- Wrote, edited and produced a training opportunities brochure featuring over 20 management, administrative and clerical improvement skills courses for over 2,000 staff.
- Summarized and evaluated needs assessment forms to help tailor programs for specific groups. This resulted in programs designed for staff working specifically with numbers and extensive proof-reading.

#### **Administrative Secretary - Compensation & Training** (1981 – 1985)

- Created and presented office skills improvement courses which provided enhancement training for more than 800 administrative and clerical support staff.



- Formulated a cost/recovery form to ensure course expenditures were kept within allocated funds.

### **EDUCATION / TRAINING**

The University of Cincinnati Evening College

The University of Cincinnati Model-NETICS Management Development Program

The University of Cincinnati Program for Group Facilitators


Notre Dame University, College & University Personnel Association Midwest Trainers Conference

Xavier University, Training the Trainer: Classroom Techniques

Certified Proof-A-Matics and Number Skills Trainer

## BIOGRAPHICAL SKETCH

Provide the following information for the key personnel in the order listed on Form Page 2.  
Photocopy this page or follow this format for each person. **DO NOT EXCEED THREE PAGES**

NAME 		POSITION TITLE Field Service Instructor (35% FTE)	
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)			
INSTITUTION AND LOCATION	DEGREE (If applicable)	YEAR(s)	FIELD OF STUDY
Grand Valley State University, Grand Rapids, Michigan	BS	Four	Social Sciences

RESEARCH AND PROFESSIONAL EXPERIENCE: Concluding with present position, list, in chronological order, previous employment, experience, and honors. Include present membership on any Federal Government public advisory committee. List, in chronological order, the titles, all authors, and complete references to all publications during the past three years and to representative earlier publications pertinent to this application. If the list of publications in the last three years exceeds two pages, select the most pertinent publications.

### HONORS/COMMITTEES:

Member, Ohio Department of Health Lead Advisory Environmental Workgroup (2005-present)  
Member, Hamilton County Lead Poisoning Prevention Collaborative (2004-present)

### WORK EXPERIENCE

Credentialed: Healthy Homes Specialist, National Environmental Health Association

Health Foundation/Healthy Moms and Babies 2007 – Present

Project Manager, Community Health Worker Project/Program Manager, Pathways Program of Greater Cincinnati  
Contract to design a Community Health Worker program and business plan to improve health and social outcomes and access to care for vulnerable populations in the region. Components include: regional survey scan, state certification and training, identified critical health/social outcomes, best practice management structure, quality assurance and evaluation plan, and identify funding structures for the model.

University of Cincinnati College of Medicine, Continuing Education 1994 - Present

Cincinnati, Ohio  
Certified Master Instructor, State of Ohio and Kentucky - Lead Abatement Worker, Lead Renovator and Essential Maintenance Practices Courses. Special topics/Hands-on Instructor, State of Ohio Lead Inspector, Risk Assessor, Contractor Supervisor Courses.

National Healthy Homes Training Center and Network/UC Regional Site 2005 – Present

National facilitator for national healthy housing initiative and training program: Essentials of Healthy Homes: Practitioners Course. Participation in course development, evaluation and testing.

National Corrective Training Institute 2004 – 2006

Trainer for court diversion program. Students referred from the court system for theft. Facilitated one-day training monthly. Program focus is on behavior, outcomes and making positive change.

Hamilton County Health District July – December 2005

Health Educator for Senior Falls Prevention Task Force. Provide falls prevention presentations to area seniors and staff. Development and coordination of needs assessment for emergency room health care professionals.

Project Manager 1999 – 10/2003

Community Lead Education and Reduction Corps (CLEARCorps) Project  
Better Housing League, Cincinnati, Ohio (513) 721-6855

Pre-project planning and development of national CLEARCorps affiliate at Better Housing League.  
Establishment and delivery of hiring, training, supervising and retention structure for annual AmeriCorps teams.  
Hiring and supervising of project staff.

Development of childhood lead poisoning prevention program for the region that includes community education with families, property owners and health practitioners. Developed and managed licensed lead abatement contractor services and technical assistance program for lead hazards prevention and removal.

Coordinate efforts of collaborating agencies; create and administer operating budget; participate in fund raising and grant writing to attain financial objectives.

Developed curriculum, outreach and facilitation of lead safe prevention trainings for property owners.

Research Consultant

1998 - 1999

University of Cincinnati Department of Environmental Health  
Cincinnati, Ohio (513) 558-1729

Coordination of HUD funded Exterior Dust and Soil and Method Detection Limit Projects. Tracked and coordinated laboratory data for review of lead dust results at minimum detection. Supervised student data entry workers. Coordinated logistics for sampling field project in seven states.

National Project Director

1996 - 1998

Project Manager

1996 - 1997

Occupational Safety and Health Educator

1992 - 1996

International Brotherhood of Teamsters Research and Safety and Health Departments  
Washington, D.C. and Cincinnati, Ohio (202) 624-6927

National Project Director of Teamster Training and Reemployment Project. Overall direction for two-state worker dislocation project funded by the U.S. Department of Labor. Supervised and directed five field staff, developed and implemented project policy and budget in conjunction with federal, state and local reemployment agency administrators.

Project Manager for Teamster/Human Resource Development Training Assessment Project.

Coordination of training needs assessment in the trucking and food processing industries in conjunction with the AFL-CIO Human Resource Development Institute. Research and grant writing for the application of Multi-State National Reserve Funds for dislocated freight members in three states.

Occupational Safety and Health Educator for the development and coordination of training materials, train-the-trainer program with Teamster truck drivers, and teaching of Hazardous Materials Transportation curriculum (DOT HM 181). Development of training materials for Hazardous Waste Worker training courses. Provide technical assistance to members on DOT, FAA and OSHA regulations. Coordinate employer-union training programs.

Director

1990 - 1991

Wisconsin Coalition on Occupational Safety and Health (WISCOSH)  
Milwaukee, Wisconsin (414) 933-2338

Responsible for office and staff management, grant writing, technical service requests, training and resource management.

Director

1984 - 1990

Southeast Michigan Coalition on Occupational Safety and Health (SEMCOSH)  
Detroit, Michigan (313) 961-3345

Director of Occupational Safety and Health Agency with program staff and diverse training and technical assistance programs servicing southwest Michigan. Development of Safety, Education and Training Programs for Michigan Department of Labor grants program. Development of EPA and Michigan Asbestos Safety Training Center. Oversight of NIEHS Hazardous Waste Worker Training Grant, Midwest Consortium for Hazardous Waste Worker Training.

Consulting

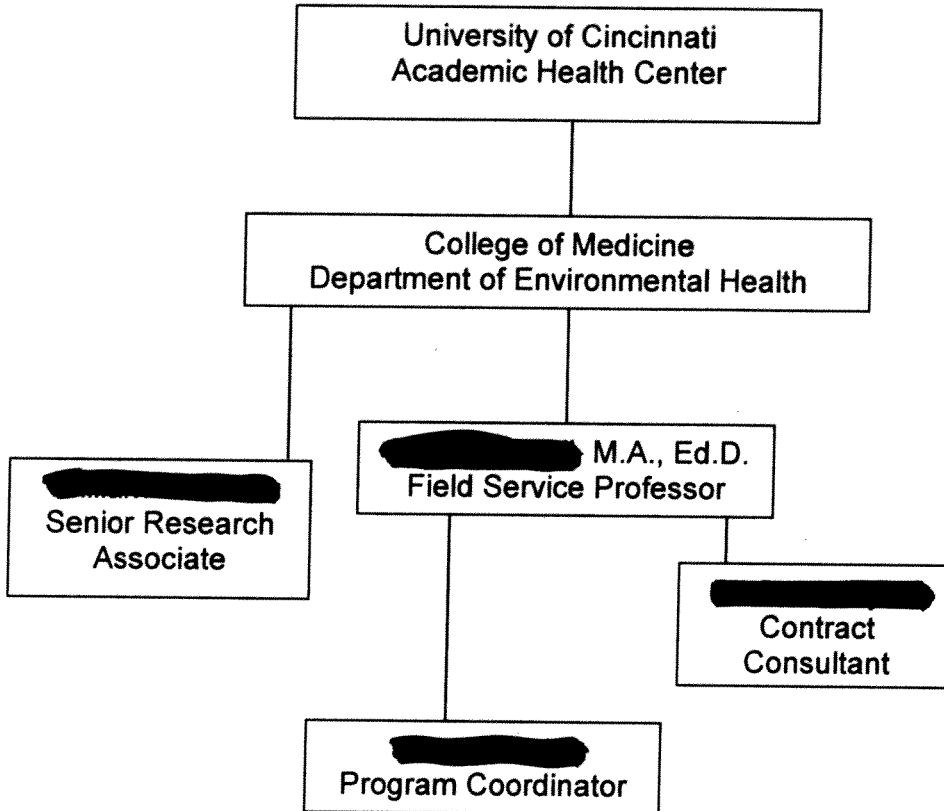
1987 - 1999

Detroit College of Business; UAW/Ford National Training Development Center, Hazard Communication Training; Ontario Secondary School Teacher's Union; Canadian Union of Public Employees; Ontario English Catholic Teachers Association; Teamsters Union, Instructor for Hazardous Waste Worker Courses; Greater Cincinnati Occupational Health Center

**PUBLICATIONS:**

398/2590 (Rev. 05/01)

## Organizational Chart



June 25, 2008



[REDACTED], M.A., Ed.D.  
Professor, Dept. of Environmental Health  
Director, Cincinnati Education & Research  
Center Continuing Education Program  
2180 E. Galbraith Road, Building A  
Cincinnati, Ohio 45237-1625

Dear [REDACTED]

It is our pleasure to extend our offer of cooperation to the University of Cincinnati in undertaking the scope of work detailed in its application for a HUD Lead Technical Studies Program Grant. It is our understanding the proposed effort will seek to evaluate certain modifications to existing methods and practices for worker training on renovation and remodeling work practices and on visual assessment of lead paint hazards. Should the University receive the funding to carry out this project, NPCA expects to assist directly in the identification of study participants for the proposed studies.

As the developers of the original lead abatement training curricula for supervisors and project designers for the U.S.EPA, the University of Cincinnati has the expertise and commitment to produce a high quality work product evaluating these proposed modifications to existing training.

The National Paint and Coatings Association, Inc. (NPCA) has considerable experience in promoting and providing lead safe work practice training nationally, and views the project proposed by the University of Cincinnati as having the potential to discern useful training improvements. Accordingly, we believe the proposed project has considerable merits and wish you the very best in your efforts in the pursuit of this grant.

Sincerely,

[REDACTED]

Stephen R. Sides, CIH  
Vice President  
National Paint and Coatings Association, Inc.

Supporting Rating Factor 3





# OHIO DEPARTMENT OF HEALTH

246 North High Street  
Columbus, Ohio 43215

Ted Strickland/Governor

614/466-3543  
www.odh.ohio.gov

Alvin D. Jackson, M.D./Director of Health

June 23, 2008

[REDACTED] M.A., Ed.D.  
Professor, Dept. of Environmental Health  
Director, Cincinnati Education & Research  
Center Continuing Education Program  
2180 E. Galbraith Road, Building A  
Cincinnati, Ohio 45237-1625

RE: Letter of Cooperation

Dear [REDACTED]

It is our pleasure to enthusiastically support the University of Cincinnati's application for a HUD Lead Technical Studies Program Grant to improve existing methods of worker training in regard to renovation/remodeling work practices and visual assessment of lead paint hazards. Should the University receive the funding to carry out this project, we will work with you to identify participants for the studies you propose.

As the developers of the original lead abatement training curricula for supervisors and project designers for the U.S.EPA, we are confident the University of Cincinnati has the expertise and commitment to produce only the highest quality results from this project.

The Ohio Department of Health views this project as not only having the potential to improve lead safe work practice training in our State, but also nationally. For this reason we wish you the very best in this effort.

Sincerely,

[REDACTED]

David E. Holston, R.S., Chief  
Environmental Abatement Section  
Bureau of Diagnostic Safety and Personnel Certification



# National Center for Healthy Housing

June 23, 2008

[REDACTED] M.A., Ed.D.  
Professor, Dept. of Environmental Health  
Director, Cincinnati Education & Research  
Center Continuing Education Program  
2180 E. Galbraith Road, Building A  
Cincinnati, Ohio 45237-1625

Dear Dr. [REDACTED]

Per our discussion, NCHH would be pleased to provide the following cooperation for University of Cincinnati's application for a HUD Lead Technical Studies Program Grant to improve existing methods of worker training in regard to renovation/remodeling work practices and visual assessment of lead paint hazards:

1. Provide the results of NCHH's on-line Pediatric Environmental Home Assessment training including the information on nurses who completed the training, their assessment results and follow-up.
2. Provide the results of NCHH's visual assessment exercise for Healthy Homes Specialists seeking to obtain their Healthy Homes Specialists Credential.
3. Work with University of Cincinnati to obtain information from the National Paint and Coating Associations database on students completing the Lead-Safe Work Practices course that it has offered for the past four years.

As the developers of the original lead abatement training curricula for supervisors and project designers for the U.S.EPA, we are confident the University of Cincinnati has the expertise and commitment to produce only the highest quality results from this project.

The National Center for Healthy Housing views this project as having the potential to improve lead safe work practice training nationally. For this reason we wish you the very best in this effort.

Sincerely,

[REDACTED]

Tom Neltner  
Director of Training and Education

*Building a lead-safe and healthy home environment for all children*

10320 LITTLE PATUXENT PARKWAY, SUITE 500, COLUMBIA, MARYLAND 21044 • 410.992.0712 • FAX 443.539.4150  
[www.centerforhealthyhousing.org](http://www.centerforhealthyhousing.org)

Supporting Rating Factor 3



Dear Lead-Safe Renovator/Remodeler: The Department of Housing and Urban Development has chosen our program at the University of Cincinnati to help them in determining your opinions/reactions to the training you received as a lead-safe renovator. To accomplish this task, we are sending this survey for you to complete and return to us in the postage-free envelope provided. Although we are asking some personal information about you (sex, age, education, etc.), we are not requesting your name so that your answers to this survey will be anonymous. In appreciation for your participation in this survey, we are including \$2.00 and our thanks.

**A. About you:**

1. Length of time since completing your training course:  
Less than 1 month ☐ 1 to 2 months ☐ 2 to 4 months ☐ Greater than 4 months ☐
2. Where did you receive your training course for lead-safe renovation/remodeling?  
  
\_\_\_\_\_
3. Age: Under 19 ☐ 19-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ Over 60 ☐
4. Male ☐ Female ☐
5. Education: Less than H.S. Diploma ☐ H.S. ☐ Some College ☐ Bachelor's ☐ Advanced Degree ☐
6. How often do you perform lead-safe renovation and remodeling work?  
Less than once/month ☐ 2-3 times/month ☐ weekly ☐

**B. About your training:**

7. Think about your training on Site Preparation/Containment (anything that stops lead-contaminated dust from spreading beyond the work area to non-work areas) which included such things as:
  - The use of plastic sheeting on the floor surrounding a small work area
  - fully sealing work room – including door flaps
  - Limiting access to the area
  - Covering belongings not movable
  - Removing belongings that can be moved
  - Closing windows, doors, and sealing the HVAC system
  - Using barriers and signs to keep people out

Now, please answer these questions regarding this topic of training:

- 7a. Was your training (please circle the number below):
  - 1) mostly lecturing on this topic
  - 2) mostly a problem-solving exercise with different scenarios
  - 3) some other form of "hands-on" activity \_\_\_\_\_
  - 4) I do not remember anything about how this training topic was taught.
- 7b. Which of the following is **NOT** considered a good way to protect residents from lead hazards during the conduct of maintenance work? (please circle your answer)
  - a. Sealing off forced air ducts in the work area
  - b. Prohibiting residents and children from entering the work area
  - c. Covering the residents' belongings with a "painters tarp" or drop cloth
  - d. Placing plastic ("poly") sheeting on the floor of the work area and using painter's tape to keep it stable



7c. On a scale of 1-10 (where 10 indicates the highest level), what is the level of confidence you have in your ability to perform the skills related to site preparation/containment related to the training you received? ☐

8. Think about your training on **Safe Work Practices** (lead safe work practices are specific practices that create less dust and/or control its spread better than traditional work practices) which included such things as:

- Chemical stripping
- Wet sanding
- Heat gun on low
- Power tools with HEPA exhaust filter
- Score paint
- Minimize pounding, hammering
- Mist surroundings with water
- Mist before drilling and cutting

Now, please answer these questions regarding this topic of training:

8a. Was your training (please circle the number below):

- 1) mostly lecturing on this topic
- 2) mostly a problem-solving exercise with different scenarios
- 3) some other form of "hands-on" activity \_\_\_\_\_
- 4) I do not remember anything about how this training topic was taught.

8b. (test item)

8c. On a scale of 1-10 (where 10 indicates the highest level), what is the level of confidence you have in your ability to perform the skills related to site preparation/containment related to the training you received? ☐

Etc.

**Certification of  
Consistency with  
the RC/EZ/EC-IIa  
Strategic Plan**

U.S. Department of Housing  
and Urban Development

I certify that the proposed activities/projects in this application are consistent with the strategic plan of a federally-designated empowerment zone (EZ), designated by HUD or by the United States Department of Agriculture (USDA), the tax incentive utilization plan for an urban or rural renewal community (RC) designated by HUD, or the strategic plan for an enterprise community (EC-II) designation in round II by USDA.

(Type or clearly print the following information)

Applicant Name

Name of the Federal  
Program to which the  
applicant is applying

Lead Technical Studies

Name of RC/EZ/EC-II Cincinnati Urban Round 2 Empowerment Zone

I further certify that the proposed activities/projects will be located within the RC/EZ/EC-II identified above and are intended to serve the residents of the designated area. (2 points)

Name of the  
Official Authorized  
to Certify the RC/EZ/EC-II

Title

CEO

Signature

Date (mm/dd/yyyy)

7/1/08

## References:

- Blair, P. (2008). Tips for Structured On Job Training (OJT). Can be found at [www.petebclair.com/tips4.htm](http://www.petebclair.com/tips4.htm). Accessed 6/2008.
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- Cohen, H.H., & Jensen, R.C. (1983). Measuring the effectiveness of an industrial lift truck safety training program. Journal of Safety Research, 15, 125-135.
- Duncker, K. (1945). On problem solving (L.S. Lees, Trans). Psychological Monographs, 58, 407-416.
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- Feldmann, T.B., Bell, R.A., Purifoy, F.E., Stephenson, J.J., Schweinhart, A., & Grissom, S. (1990). Outcomes of AIDS training for supervisory and nonsupervisory personnel in the workplace. Journal of Occupational Medicine, 32(2), 103-109.
- Hale, A.R. (1984). Is safety training worthwhile? Journal of Occupational Accidents, 6, 17-33.
- Kelley, A.I., Orget, R.F., & Baer, D.M. (Jan. 1985). Seven strategies that guarantee training transfer. Training and Development Journal, 78-82.
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- Rohmert, W., & Laurig, W. (1977). Increasing awareness of ergonomics by in-company courses—a case study. Applied Ergonomics, 8(1), 19-21.
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[illegible]

## Grant Application Detailed Budget Worksheet

## Detailed Description of Budget

6a. Consumable Supplies	Quantity	Unit Cost	Estimated Cost	HUD Share	Applicant Match	Other HUD Funds	Other Federal Share	State Share	Local/Tribal Share	Other	Program Income
Outgoing Postage	4000	\$1.00	\$4,000								
Return Postage	4000	\$0.50	\$2,000								
Stationery & Envelopes	4000	\$1.00	\$4,000								
Trainee Manuals	300	\$10.00	\$3,000								
Trainee Handouts	300	\$3.00	\$900								
Supplies	600	\$3.00	\$1,800								
Personal Protective Supplies	1	\$200.00	\$200								
Polyethylene	2	\$50.00	\$100								
Cleaning Supplies	1	\$100.00	\$100								
Plastic Containers	4	\$15.00	\$60								
Visual Aids	30	\$30.00	\$900								
Subtotal - Consumable Supplies			\$17,060								
6b. Non-Consumable Materials	Quantity	Unit Cost	Estimated Cost	HUD Share	Applicant Match	Other HUD Funds	Other Federal Share	State Share	Local/Tribal Share	Other	Program Income
Dell Latitude D630 Computer	1	\$1,676.00	\$1,676								
NEC VT491 LCD Projector	1	\$699.00	\$699								
Subtotal - Non-Consumable Materials			\$2,375								
Total Supplies and Materials Cost			\$19,435								
6. Consultants (Type)	Days	Rate per Day	Estimated Cost	HUD Share	Applicant Match	Other HUD Funds	Other Federal Share	State Share	Local/Tribal Share	Other	Program Income
Instructional Designer	234	\$346.50	\$81,082								
Total Consultants Cost			\$81,082								
7. Contracts and Sub-Grantees (List Individually)	Quantity	Unit Cost	Estimated Cost	HUD Share	Applicant Match	Other HUD Funds	Other Federal Share	State Share	Local/Tribal Share	Other	Program Income









# **Grant Application Detailed Budget Worksheet**

Analysis of Total Estimated Costs		Detailed Description of Budget	
		Estimated Cost	Percent of Total
1	Personnel (Direct Labor)	\$ 113,072	24.2%
2	Fringe Benefits	\$ 38,484	8.2%
3	Travel	\$ 10,927	2.3%
4	Equipment	\$ -	0.0%
5	Supplies and Materials	\$ 19,435	4.2%
6	Consultants	\$ 81,082	17.3%
7	Contracts and Sub-Grantees	\$ -	0.0%
8	Construction	\$ -	0.0%
9	Other Direct Costs	\$ 36,720	7.9%
10	Indirect Costs	\$ 167,843	35.9%
	<b>Total:</b>	<b>\$ 467,563</b>	<b>100.0%</b>
	<b>Federal Share:</b>		
	<b>Match</b> (Expressed as a percentage of the Federal Share):		

## EFFECTIVENESS OF HUD REQUIRED LEAD TRAINING JUSTIFICATION

<u>Personnel</u>	FTE	Salary	Benefits	Total
[REDACTED]	25%	\$80,277	\$25,877	\$106,154
	1%	\$4,700	\$1,516	\$6,216
	5%	\$13,222	\$4,758	\$17,980
	10%	\$10,456	\$4,745	\$15,201
	(5% year two only)	\$4,417	\$1,589	\$6,005

**Personnel Subtotal \$151,556**

**Principal Investigator, [REDACTED] MA, EdD: (3.0 Calendar Months)**

- Lead person for both studies/projects.
- Prepare and oversee IRB Submission & Review Process.
- Prepare and submit quality assurance program
- Quarterly and Final Report preparation and submission.
- Assist with development of SOJT module for incorporation into the hands-on modules of lead-safe work practices training and development of 1-hour visual assessment classroom module with [REDACTED]
- Develop survey instruments and pilot test them for both studies.
- Oversee distribution of surveys for both studies and supervise data entry.
- Work with [REDACTED] and [REDACTED] with the analysis of survey response and evaluation response data.
- Prepare final report and publishable manuscript for submission (input from [REDACTED] and [REDACTED]).

**Advisor, [REDACTED] PhD (0.12 Calendar Months):** [REDACTED] will be acting as an advisor throughout the project but most especially with the analysis of the project and final report to HUD.

**Advisor, [REDACTED] MS (0.60 Calendar Months):** [REDACTED] will be assisting with curriculum development and review. He will oversee the data quality assurance mechanisms. He will also be acting as an advisor throughout the project but most especially with the analysis of the project and final report to HUD.

**IT /Production Manager, [REDACTED] (0.60 Calendar Months only year two):**  
Mr. [REDACTED] will oversee the digital capturing of the one-hour visual assessment classroom course as well as its final production.

**Logistics Coordinator/Data Entry, [REDACTED] (1.20 Calendar Months):**

- Handle logistics of LSR/EMP and visual assessment courses with [REDACTED]
- Assist with survey development and distribution as well as response receipt and data input
- Assist [REDACTED] with preparation and submission of reports.

**Consultant-Instructional Designer/Course Instructor**

[REDACTED] (TBD)	Year 1 \$54,054	Year 2 \$13,514	Year 3 \$13,514	
				<b><u>Consultant Subtotal \$81,082</u></b>

**Consultant-Instructional Designer/Course Instructor, [REDACTED]**

- Teach LSR/EMP and 1-hour visual assessment courses.
- Assist in development of SOJT module for LSR/EMP courses.
- Assist with development and piloting of surveys.
- Assist with the development of the 1-hour visual assessment classroom module.
- Recruit participants to complete the LSR/EMP, HUD on-line visual assessment course, and the new 1-hour classroom visual assessment course.
- Assist with data analysis for the final report and publishable manuscript.

**Other****Survey Questionnaire Distributions**

Database collection for *study #1* (UC; ODH; Varga-Wilson; NPCA) \$1,000  
Database collection for *study #2* (NPCA; CHH; UC) \$1,000

**Other Subtotal: \$2,000****Mailings*****Study #1* – 2,000 questionnaires**

Outgoing postage @\$1	\$2,000
Return postage @ \$.50	\$1,000
Stationery & envelopes	\$2,000
Duplication (2,000 @ .04/2 pages	\$ 160

***Study #2* – 2000 questionnaires**

Outgoing postage @\$1	\$2,000
Return postage @ \$.50	\$1,000
Stationery & envelopes	\$2,000
Duplication (2,000 @ .04/2 pages	\$ 160

**Mailing Subtotal: \$10,320****Training Course Costs – Year One*****Study #1***

Trainee Manuals (10 courses X 10 trainees X \$10)	\$1,000
Supplies (10 X 10 X \$3)	\$ 300
Lunches & Breaks (10 X 10 X \$25)	\$ 2,500
Certificates, Data input, records, notices, etc. @ \$5/ea	\$ 500

***Study #2***

Trainee Handouts (10 courses X 10 Trainees X \$3)	\$ 300
Supplies (10 X 10 X \$3)	\$ 300
Snacks (10 X 10 X \$6)	\$ 600

**Training Course Costs – Year Two*****Study #1***

Trainee Manuals (10 courses X 10 trainees X \$10)	\$1,000
Supplies (10 X 10 X \$3)	\$ 300
Lunches & Breaks (10 X 10 X \$25)	\$ 2,500
Certificates, Data input, records, notices, etc. @ \$5/ea	\$ 500

***Study #2***

Trainee Handouts (10 courses X 10 Trainees X \$3)	\$ 300
Supplies (10 X 10 X \$3)	\$ 300
Snacks (10 X 10 X \$6)	\$ 600

#### Training Course Costs – Year Three

##### Study #1

Trainee Manuals (10 courses X 10 trainees X \$10)	\$1,000
Supplies (10 X 10 X \$3)	\$ 300
Lunches & Breaks (10 X 10 X \$25)	\$ 2,500
Certificates, Data input, records, notices, etc. @ \$5/ea	\$ 500

##### Study #2

Trainee Handouts (10 courses X 10 Trainees X \$3)	\$ 300
Supplies (10 X 10 X \$3)	\$ 300
Snacks (10 X 10 X \$6)	\$ 600

#### Training Course Subtotal: \$16,500

#### One-Time Training Supplies Purchases

<u>Study #1</u> Personal Protective Supplies: gloves, goggles, respirator, Protective clothing, etc.	\$ 200
Polyethylene (plastic sheets – 2, 100X12' rolls @ \$50)	\$ 100
Cleaning Supplies (1 set)	\$ 100
4 large plastic containers with lids @ \$15	\$ 60

##### Study #2

Visual Aids: 30 large laminated 3'X3' photos/graphics @ \$30/ea	\$ 900
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##### Studies #1 & #2

Dell Latitude D630 Laptop Computer	\$ 1,676
NEC VT491 LCD projector	\$ 699

#### Training Supplies Subtotal: \$3,735

#### Staff Travel

##### Year 1:

Two (2) staff to Columbia, MD (1.5 days) consultation w/NCHH personnel (\$1300 airfare + 2 hotel rooms @ \$150/ea = \$300 + per diem for 2 = \$111)	\$1,711
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Two (2) staff to Columbus, Ohio (1-day) consult w/ODH 250 miles RT @ \$.505	\$ 126
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Two (2) staff to Indianapolis, IN (1.5 days) consultation w/NCHH personnel (230 mi. RT @ \$.505 = \$116 + 2 hotel rooms @ \$150/ea = \$300 + per diem for 2 = \$111)	\$ 527
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Two (2) staff to Pittsburgh, PA (1.5 days) consultation w/J. Zilka program development of SOJT module (600 mi. RT @ \$.505 = \$303 + 2 hotel rooms @ \$150/ea = \$300 + per diem for 2 = \$111)	\$ 714
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Two (2) staff to Washington, DC (2days) HUD Meetings (\$1300 airfare + 2 hotel rooms @ 150/ea= \$300 + \$148 per diem + 70 local/airport transportation, parking and misc)	\$1,81
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Instructor Travel for Study #1 Training Course (10 X 30mi RT X \$.505)	\$ 152
Instructor Travel for Study # 2 Training Course(10 X 50mi RT X \$.505)	\$ 253

Year 2:

Two (2) staff to Columbus, Ohio (1-day) consult w/ODH 250 miles RT @ \$.505	\$ 126
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Two (2) staff to Indianapolis, IN (1.5 days) consultation w/NCHH personnel (230 mi. RT @ \$.505 = \$116 + 2 hotel rooms @ \$150/ea = \$300 + per diem for 2 = \$111)	\$ 527
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Two (2) staff to Washington, DC (2days) HUD Meetings (\$1300 airfare + 2 hotel rooms @ 150/ea= \$300 + \$148 per diem + 70 local/airport transportation, parking and misc)	\$1,818
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Instructor Travel for Study #1 Training Course (10 X 30mi RT X \$.505)	\$ 152
Instructor Travel for Study # 2 Training Course(10 X 50mi RT X \$.505)	\$ 253

Year 3:

Two (2) staff to Indianapolis, IN (1.5 days) consultation w/NCHH personnel (230 mi. RT @ \$.505 = \$116 + 2 hotel rooms @ \$150/ea = \$300 + per diem for 2 = \$111)	\$ 527
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Two (2) staff to Washington, DC (2days) HUD Meetings (\$1300 airfare + 2 hotel rooms @ 150/ea= \$300 + \$148 per diem + 70 local/airport transportation, parking and misc)	\$1,818
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Instructor Travel for Study #1 Training Course (10 X 30mi RT X \$.505)	\$ 152
Instructor Travel for Study # 2 Training Course(10 X 50mi RT X \$.505)	\$ 253

**Staff Travel Subtotal:\$10,927**

Trainee Incentives

Spans Years 1 – 2 Study #1:	
Survey Completion (2,000 X \$2.00)	\$4,000
Travel Reimbursements (10 X 10 X 3 yrs X \$25)	7,500
Spans Years 1 – 2 Study #2:	
Survey Completion (2,000 X \$2.00)	\$4,000
Travel Reimbursements (10 X 10 X 3 yrs X \$25)	7,500

**Trainee Incentives Subtotal: \$23,000**

Duplication and dissemination of Outcomes

Year 3

CD/DVD Duplication of Visual Assessment course (with SOJT module)	
Duplication – 10 copies @ \$50	\$ 500
Dissemination – postage @ \$10/ea	100

**Duplication and dissemination Subtotal: \$600**

University of Cincinnati	HUD Program:
SS OF HUD REQUIRED LEAD TRAI	Period:
Technical Study	Start Date:
NA	End Date:

US Department of Housing and Urban Development  
OMB Approval 2535-0114 exp. 2008 Pending  
Component Name:

MID	Policy Area Priority	Construction Type:	Services or Activities Outputs	Measures End Date:	Outcome	Measures Year 1	Evaluation Tools
C.5	B.6	Planning	Programming	4	5	6	7
		There is a need for more efficient, effective and less costly methods to evaluate (test for, identify) and control housing related lead hazards.	new- Development of SOJT module for incorporation into H-new- Survey Instrument development and pilot testing. new- Development of 1-hour classroom visual assessment Outreach and education - Sessions Participants recruited	One SOJT Module Developed  Two Survey Instruments Developed  One Course Developed  Sessions 10 Participants 200 #N/A	Impact new- New training module developed. new- New survey instruments developed. new- New training module developed. new- Persons trained	One Training Module  Two Instruments Developed  One Training Module  100  #N/A  #N/A	Accountability  A. Tools for Measurement Database      B. Where Data Maintained Specialized database
F.2	B.6	There is a need for more efficient, effective and less costly methods to evaluate (test for, identify) and control housing related lead hazards.	new- Development of SOJT module for incorporation into H-new- Survey Instrument development and pilot testing. new- Development of 1-hour classroom visual assessment Outreach and education - Sessions Participants recruited	One SOJT Module Developed  Two Survey Instruments Developed  One Course Developed  Sessions 10 Participants 200 #N/A	new- New training module developed. new- New survey instruments developed. new- New training module developed. new- Persons trained	One Training Module  Two Instruments Developed  One Training Module  100  #N/A  #N/A	C. Source of Data Testing results      D. Frequency of Collection Weekly      E. Processing of Data Statistical database

[illegible]

Applicant Name: University of Cincinnati  
 Project Name: SS OF HUD REQUIRED LEAD TRAI  
 Project Type: Technical Study  
 Construction Type: NA

HUD Program: LTS  
 Period: Start Date: End Date:

US Department of Housing and Urban Development  
 OMB Approval 2535-0114 exp. 2008 Pending  
 Component Name:

HUD Goal		Policy Priority		Construction Type:		Problem, Need, Situation		Services or Activities/Outputs		Measure				Outcome		Year 1				Evaluation Tools					
1		1		Project Type:		2		3		4		5		6		7									
Policy				NA		Planning		Programming		Pre		Post		YTD		Impact		Pre		Post		YTD		Accountability	
																			</						



University of Cincinnati	NA
DEGREE OF HUD REQUIRED	Technical Study

LTS

US Department of Housing and Urban Development  
OMB Approval 2535-0114 exp. 2008 Pending  
Component Name:

[illegible]